MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2017/2018

DCA5018 – ELECTRIC CIRCUITS
(Diploma in Electronic Engineering)

31 MAY 2018
9.00 a.m – 11.00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **4** pages with **4** questions.

2. Answer **ALL** questions. All necessary working steps must be shown.

3. Please write all your answers in the answer booklet provided.

QUESTION 1 [25 MARKS]

For the circuit shown in Figure 1, calculate the following:

    a) The total resistance.

                                                                              [4 marks]

    b) Current I_1, I_2 and I_3

                                                                              [8 marks]

    c) Current flowing through each resistor

                                                                              [3 marks]

    d) Voltage across each resistor.

                                                                             [6 marks]

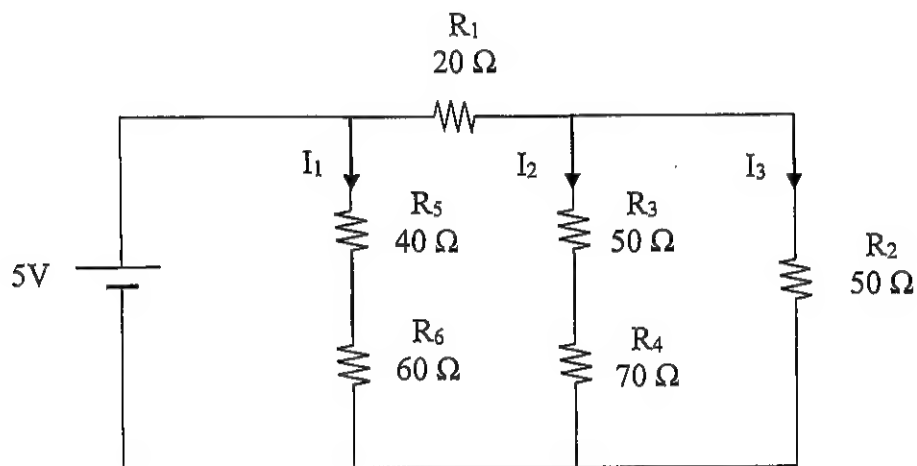   e) Power dissipated at each resistor.

                                                                              [4 marks]

Figure 1

QUESTION 2 [25 MARKS]

a) Referring to Figure 2, calculate the following by using respective theorem.

   i) Norton's Resistance (R_N) and Norton's Current (I_N). Draw the equivalent circuit.

[10 marks]

   ii) Thevenin's Resistance (R_{TH}) and Thevenin's Voltage (V_{TH}). Draw the equivalent circuit.
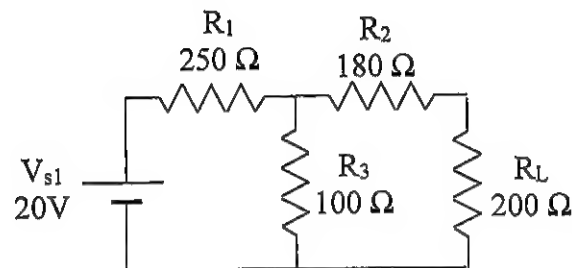
[10 marks]

Figure 2

b) By using Mesh Current Analysis method, write the loop equations involved in Figure 3.
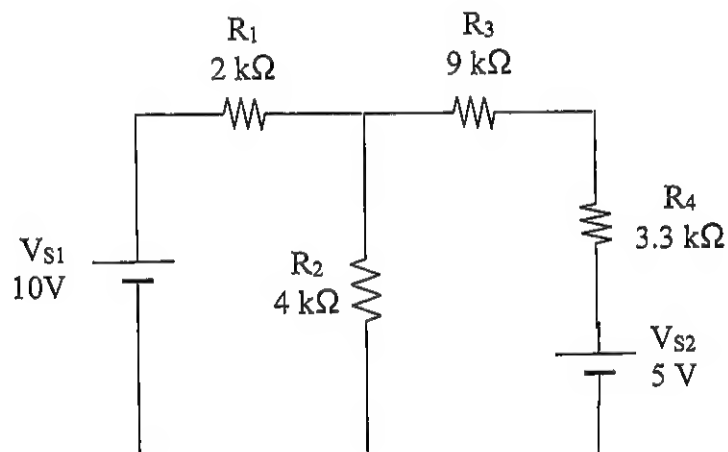
[5 marks]

Figure 3

Continued...

QUESTION 3 [25 MARKS]

By referring to the RLC circuit as shown in Figure 4:

a) Sketch the equivalent circuit representation in frequency domain.

[6 marks]

b) Calculate the total impedance in the circuit. Also sketch the impedance phasor diagram.

[7 marks]

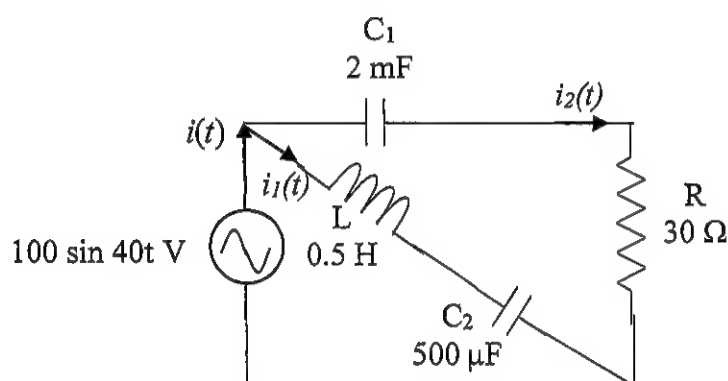c) Calculate the steady state current $i(t)$, $i_1(t)$, and $i_2(t)$ in the circuit.

[12 marks]

Figure 4

Continued...

QUESTION 4 [25 MARKS]

a) With an assistance of a formula, define Ohm's law.   [3 marks]

b) Derive the following formula for an ideal (no resistance) parallel resonant circuit.

$$f_r = \frac{1}{2\pi\sqrt{LC}}$$

[6 marks]

c) Referring to Figure 5, an inductor is in storage energy cycle. Calculate the following.

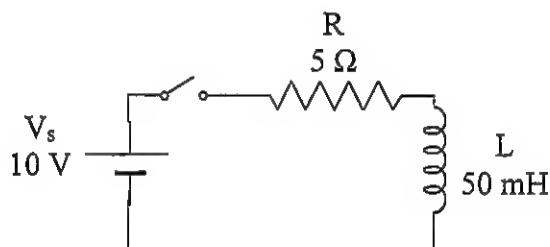|		
i)	Final steady state value of the current.	[3 marks]
ii)	Time constant of the RL series circuit.	[3 marks]
iii)	Transient time of the RL series circuit.	[2 marks]
iv)	Value of the inductance voltage after 10 ms.	[4 marks]
v)	Value of the circuit current 20 ms after the switch is closed	[4 marks]

Figure 5